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A Study on Enhanced Energy-Efficient and Reliable Routing for Mobile Wireless Sensor Networks with authentication

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ABSTRACT: The problem of energy efficient reliable routing in wireless networks with unreliable communication links or devices or lossy wireless link layers by merging the power control schemes into the energy efficient routing is main goal of project. This work majorly focuses on the problem of energy-efficient reliable wireless communication in the presence of unreliable or loss wireless link layers in multi-hop wireless networks. Energy-Efficient and Reliable Routing (E2R2) is used for networks in which either hop-by-hop or end-to-end retransmissions ensure reliability. In wireless sensor networks, because of unreliable wireless media, host mobility and lack of infrastructure, providing secure communications is bit difficult in this type of network environment. In present work to ensure the security in unreliable wireless communication the cluster based topology technique is used, to obtain confidentiality and authentication of nodes hash function and MAC (Message Authentication Code) techniques are used.

KEYWORDS: Energy-Efficient, Mobile Wireless Sensor Network, Reliable Routing, Authentication.

I. INTRODUCTION

A **wireless sensor network (WSN)** of spatially distributed autonomous sensors to *monitor* physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively forward their data through the nodes in network to a main server. The more enhanced networks are bi-directional, also enabling *control* of sensor activity at nodes. The implementation of wireless sensor networks was motivated by need of military applications such as battlefield surveillance; today such networks are used in many consumer and industrial applications, such as industrial monitoring and control of process, monitoring of machine health, and so on.

The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Every sensor node has typically several parts: a radio transceiverwith an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. A sensor nodesize might vary from that of a shoebox down to the size of a grain of dust. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of rupees, which depends on the complexity of the every individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding resources constrains such as energy, memory, computational speed and communications bandwidth. The topology of the WSNs can differ from a simple star network to an advanced multi-hop wireless network. Figure 1 shows typical multi-hope wireless sensor network. The navigation technique between the hops of the network can be flooding or routing.

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The main characteristics of a WSN include:

- Power consumption parameter for nodes using batteries or energy harvesting.
- Ability to handle with node failures.
- Mobility of nodes.
- Diversification of nodes.
- Scalability to very large scale of deployment.
- Ability to handle harsh environmental conditions.
- Ease of use.
- Cross-layer design.

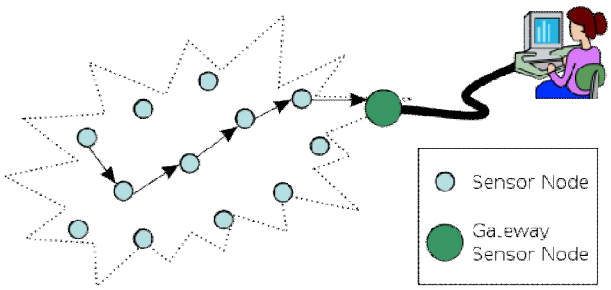

Figure 1.Typical Multi-hop Wireless Sensor Network

II. LITERATURE SURVEY

Wireless Sensor Networks (WSNs) and its applications have shown changes in the last few years. Since there is a need to operate with parameterized node resources, minimum network resources and the operating in an ad hoc manner, applying security functionality to protect against attacker nodes becomes a challenging yet interesting task. This Section Focuses on previous Methodology for trust aware routing, link failure recovery. Being a developing area, lots of literature is being published recently on the subject.

A. LITERATURE REVIEW:

G. Kalpana [1] this paper, WSN has gained wide popularity and have gone up tremendously in recent time due to increase in Micro-Electro-Mechanical Systems (MEMS) technology. WSN has to connect the virtual world with the physical world by forming a network of sensor nodes. In cluster-based routing, some special nodes that are called cluster heads form a wireless base station to the sink which collect data from sensor and forward it to base station. Energy saving in these approaches can be obtained by formation of cluster, electing cluster-head, data aggregation at the cluster-head nodes to data redundancy reduction and thus save energy. Due to the scarce energy resources of sensors, one of the main problems in the design of routing protocols for WSNs is energy efficiency.

Therefore, routing protocols designed for WSNs should be as highly energy efficient to increase the lifetime of individual sensors, and also the network lifetime. We have studied a routing protocol and we got queries and databases using sensor nodes and interaction with the location-based routing protocol are generally open issues for further research. Future research issues should focus on more security, better QoS and high node mobility. Routing techniques for WSNs should address application security issues such as reliability, authentication, confidentiality etc.

Mohammad Masdari [2] in this paper, Multipath routing protocols improve the general load balancing and high quality of service in WSN and also generate reliable communication in network. This checks various multi-path routing protocols of the WSN in the literature and displays its benefits. The main elements of these techniques and classifications are based on their attributes which have been discussed in paper. Multipath routing is one of the efficient methods to improve the network capacity and productivity of resources under hefty traffic conditions. It presented a

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analysis of multipath routing protocols in wireless sensor networks. The authors also specified the problems related to implementing multipath routing protocols in WSN and compare various properties of routing protocols. The comparison is of great importance to understand the previous solutions and also design new multipath routing protocols.

K. Vinoth Kumar [3] this paper work aims at implementing a multi-hop energy effective, fault tolerant and reliable routing protocol. It presents to maintain an network of sensors so that the nodes get a chance to generate their transmission ranges best, and thus delivery of data to the base station. This protocol concentrates on the feature of load sharing by maintaining multiple routes and selecting the best one for forwarding the data packets. The problem around the sink is managed by changing the transmission ranges of the nodes timely, which changes the topology, to balance the availability among the nodes in the network. The focus was towards constant distribution of data transmission and dissemination of load among the nodes in the network. We surveyed the specification of motes and concluded that by adjusting per-node transmission power, it is possible to control topology and thus eliminate the bottleneck of the base station. It results in increasing of lifetime of the network.

Ning Sun [4] in this paper, Energy awareness is used to design a reliable routing protocol for wireless sensor networks (WSNs) due to the limited capability of the nodes. Reliability has a more important issue in WSNs, since the nodes are fear to fail and the networks are highly unstable. The proposed Energy Efficient and Reliable Routing Protocol (E2R2P) use clustering to effectively decrease the amount of data transmissions between nodes and the sink (BS). Furthermore, our protocol allows cluster heads (CHs) transmit data to the sink along multiple paths, so that it improves the reliability of transmission even if some paths are in failure, in the same time reduce the consumption of energy of the complete network. E2R2P uses probability algorithm to generate network into clusters, which reduces the number of messages that are required to be delivered in the network.

Furthermore, algorithms of cluster head rotation and multipath discovery are implemented to evenly distribute energy among all the nodes. Both of the process of cluster formation and multiple path discovery are in form of distribute, it provides guarantee to scalability of the network. The methods in turn result in load balance and fault tolerance, finally increased network lifetime.

Ali Norouzi1 [5] in this paper, WSNs are deployed in several applications; energy usage is the determining factor in the performance of WSN. Consequently, methods of data routing and transferring to the sinks are very important because the sensor nodes run on battery power and the energy available for sensors is quite limited. We intend to propose a new protocol called Fair Efficient Location-based Gossiping (FE Gossip-ing) to focus the problems. Saving the nodes energy leads to an increase in the node lifetime in the network, in comparison with the other routing protocols. Furthermore, the protocol reduces navigation delay and loss of packets. Hence we studied the operation of a routing protocol with safe energy consumption, and discussed the factors of energy optimization.

And we find the ways in which we choose the next hop, the network lifetime can be increased. As a result, we have extended the network lifetime, an increased packet delivery ratio, reduced the message overheads and the energy consumed by the nodes is reduced. In Wireless Networks" we propose a new routing protocol that optimizes energy consumption and bandwidth. Using less energy in routing protocols reduce overhead.

Satvir Singh [6] in this paper, an energy efficient routing is a important issue in the implementing of Wireless Sensor Network (WSN) protocols. It presents a comprehensive survey on energy efficient routing protocols in WSNs. From the protocols, it is clearly seen so far that, the performance of protocols is worth better in terms of energy efficiency. There is very little research done in improving better QoS parameters in a very energy sensor networks. The sink node and sensor node are mostly constant thus research can be done by assuming sink and source node as mobile Various topologies, routing algorithms can be used based on the different application of WSN. Results can be improved using multiple sink nodes.

Monica R Mundada [7] in this paper, WSN consists of low cost, low power, small in size and multi-operational sensor nodes. Routing protocols in WSNs emphasize on data, limited battery power and bandwidth in order to facilitate efficient working of the network, thereby increasing the lifetime of the network. WSN has a design trade-off between energy and communication overhead which makes the nerve center of the all routing techniques. It presents a survey of routing techniques in WSNs under all the three categories. We epitomize these routing techniques and bring out the advantages and drawbacks followed by their domain. We classify the routing protocols in WSNs into data centric, hierarchical and geo location based depending on the network infrastructure. Data-centric protocols use the metadata to

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transmit the sensed information to the ink. Naming the data helps to construct a query which requests for only certain parameters of the data, thus known as data-centric routing protocols. Hierarchical routing protocols adopt the clustering method by combining sensor nodes. This approach is highly scalable and thus used in a number of applications.

Location based protocols use the information of location of sensor nodes intelligently to route data. We optimize the logic behind these protocols followed by the advantages and attributes. We also mention the possible domain of these protocols and scope for improvement in the near future.

Ahmed Ali Saihood [8] implementing energy efficient and reliable routing protocols for mobility applications of WSN such as monitoring wildlife, surveillance of battlefield and health monitoring is a great problem since topology of the network changes frequently. Previous mobile routing protocols such as LFCPMWSN, LEACH-Mobile, LEACH-Mobile and CBR-Mobile consider only the energy efficiency of the wireless sensor nodes. However, reliability of protocols by incorporating fault tolerance is significantly important to identify the failure of link and sensor nodes and recover the path. The protocols allocate extra slots using time scheme to accommodate nodes that enter a cluster because of mobility and thus, increases delay. Enhanced the previous in which we reduce network energy consumptions and slightly less transmission delay than the previous protocols also incorporates a simple approach to localize sensor nodes during cluster generation and every time a sensor moves to another cluster. Protocol is more efficient in terms of energy consumptions, have less network delay, Packet Delivery Ratio is higher than those of the previous protocol.

NehaRathi [9] in this paper, WSNs are restricted by storage capacity, energy and computing power. So it is necessary to design effective and energy aware protocol in order to increase the network lifetime. A review on routing protocol in WSNs is carried out which are classified as data centric, hybrid and geo location based depending on the network. Then some of the multipath routing protocols which are widely used in WSNs to improve performance are also checked and compared with the performances of protocols. Routing protocols are discussed based on three categories: Flat based routing, hybrid-routing and geo Location-based routing on the basis of network structure and trying to increase the lifetime of the wireless sensor network. Most of the routing protocols require information of location for sensor nodes in wireless sensor networks to calculate the distance between two nodes on the basis of signal so that energy consumption can be calculated. Single-path routing approach is unable to provide effective data rate transmission in wireless sensor networks due to the limited capacity of a multi-hop path and the dynamics of wireless links. This problem can be removed by using multipath routing.

To evaluate the trustworthiness of a sensor node, multiple points of its nature can be monitored. Each of them aims at finding a specific type of attack. For example, each time node s1 selects node s3 for forwarding its data it enters the promiscuous in order to check whether node s3 successfully forwarded it. After a number of comparing the successfully sent packets to the number of packet s1 sent to s3, the source node (node s1) can assess the sincere running of the routing protocol while a failure reveals a selfish and/or malicious node acting as a black hole. Similarly, measuring the packets correctly sent without being modified, nodes issuing modification attacks can be detected.

III. GOALS & OBJECTIVE OF E2R2

E2R2 mainly guards a WSN against the attacks directing the multi-hop routing, especially those based on theft through replaying the routing information. This system does not address the denial-of-service (DoS) attacks, where an attacker intends to affect the network by using its resource. For instance, we do not address the DoS attack of congestion network by resending numerous packets or physically blocking the network. E2R2 aims to achieve the following desirable properties: High Packet delivery rate, Energy Efficiency, scalability and adaptability.

However, link failure condition is also taking into consideration by E2R2. So, packet loss, time delay such things happen due to link failure should be consider when we want to achieve high throughput [1].

IV. CONCLUSION

In this paper, we have studied an energy-efficient and reliable routing protocol for mobile WSNs. The proposed protocol E2R2 is hybrid cluster based. Each cluster contains one CH node, and the CH node is assisted by two DCH nodes, which are also called cluster nodes. Such a routing protocol may be useful when the sensor nodes and the BS are

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mobile. This study will be extended to improve the throughput even in the high-data-rate situation, where the sensor nodes generate data at a very high constant rate. The studied protocol can be also tested under the influence of highly mobile sensor nodes.

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BIOGRAPHY

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